your

NATIONAL WEATHER SERVICE

A GUIDE TO THE PRODUCTS AND SERVICES OF THE NATIONAL WEATHER SERVICE IN ALBANY, NEW YORK

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Completely Revised and Updated
October, 2003

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ABOUT THE ALBANY FORECAST OFFICE

The National Weather Service's Albany Weather Forecast Office (WFO), located at The Centers For Environmental Science and Technology Management (CESTM) (a part of the State University of New York at Albany), maintains a constant vigil for life-threatening dangers such as tornadoes, severe thunderstorms, winter storms and floods. The primary mission of the National Weather Service (NWS) is to issue warnings for these types of phenomena in an effort to minimize loss of life and property.

WFO Albany also issues a variety of public forecasts that influence the daily decisions of well over a million residents across eastern New York State, southern Vermont, western Massachusetts and northwestern Connecticut-known as WFO Albany's County Warning Area (CWA) of forecast responsibility. Commercial enterprises, public utilities, water resource managers, pilots, farmers, boaters, campers and many others in the recreational community rely on NWS forecasts for their day-to-day functioning.

The National Weather Service is continually striving for improvements in its forecast and warning capabilities. The historical trend toward the use of automated weather observing systems, Doppler weather radar, new and improved weather satellite technology, and advances in weather information processing systems have resulted in improved timeliness, as well as greater detail and specificity, of forecasts and warnings.

Temperature and precipitation records for the Albany area date as far back as the 1790s. The weather reporting station, originally at the Dudley Observatory, was the first in the U.S. to be funded by the federal government. The Albany weather office became a station of the U.S. Weather Bureau in 1874. Weather observations have been taken at various locations about the city, and since 1930, have been taken at the Albany County Airport (now Albany International Airport). Today, there are two weather observing stations in Albany. The other, located at the WFO, began keeping climate records in 1997.

More recent historical climate information for Albany International Airport is kept at the Forecast Office. Requests for specialized climate information, hardcopy data, or data for surrounding areas should be directed to either the Northeast Regional Climate Center (NERCC), or the National Climatic Data Center (NCDC). They can be reached as follows:

NERCC
1113 Bradford Hall
Cornell University
Ithaca, New York 14853
Tel. 1-607-255-1751
M-F, 8-5

NCDC
Federal Building
Asheville, NC 28801
Tel. 1-828-271-4800
M-F,8-5

The ring-thru line at the Albany Weather Forecast Office provides recorded climatic and other information 24 hours a day. It is also available between the hours of 9 AM and 4 PM weekdays, and 9 AM to NOON weekends and holidays, for those wishing to speak with a meteorologist for the purpose of obtaining verbal forecast or other weather information not routinely provided in the recording. The number is 1-518-435-9580.

COUNTY WARNING AREA (CWA) AND WARNING PROGRAM

The Albany forecast office is responsible for issuing weather warnings, watches, advisories and statements for people in the following counties:

-in eastern New York State:

Albany	Columbia	Dutchess	Fulton	Greene
Hamilton	Herkimer	Montgomery	Rensselaer	Saratoga
Schenectady	Schoharie	Ulster	Warren	Washington

-in southern Vermont: Bennington Windham

-in western Massachusetts: Berkshire

-in northwestern Connecticut: Litchfield

Appendix I is a named listing of the zone numbers in WFO Albany's CWA, while Fig. 1 is a geographical map showing these zone numbers. A map showing the CWAs for WFO Albany, as well as surrounding offices, is included as Fig. 2.

Considerable confusion seems to exist amongst the general public and some media outlets as to the difference between a weather WATCH and a WARNING.

A **WATCH** is issued to alert the public to the existence of CONDITIONS THAT ARE FAVORABLE for hazardous or severe weather development.

A **WARNING** is issued to notify people that severe weather is IMMINENT or is ALREADY OCCURRING.

An **ADVISORY** is issued to alert the public to potentially hazardous weather situations that aren't quite as severe as those for which watches and warnings are issued. Listed below are specific weather warnings, advisories and statements that are issued by WFO Albany, and the anticipated weather conditions associated with each one.

HAZARDOUS WEATHER WARNINGS

These warnings are generally issued for one or two counties at a time, and typically for no longer than one hour. The types of hazardous weather warnings include:

SEVERE THUNDERSTORM WARNING - Issued for those thunderstorms containing winds of at least 58 miles per hour, and/or hail at least 3/4 of an inch in diameter. Heavy rain and frequent lightning can be expected. Sometimes, tornadoes or flash floods are spawned by severe thunderstorms.

TORNADO WARNING - Issued when a tornado is imminent or has been observed. The advance warning capabilities of the Weather Service's WSR-88D Doppler radars enable NWS meteorologists to identify pre-tornadic signatures which may identify the actual formation of a tornado, allowing for warning lead times of up to 30 minutes. With old conventional radars, such early detection and warning was not possible.

WINTER WEATHER WARNINGS

These warnings are generally issued for much larger areas than are severe weather warnings, and for a longer period of time (generally between 6 and 12 hours, but sometimes for up to 24 hours). There are six types of winter weather warnings:

WINTER STORM WARNING - Issued when 7 or more inches of snow is expected to fall within the next 12 hours, or 9 or more inches of snow is expected to fall within the next 24 hours.

LAKE EFFECT SNOW WARNING - Issued when heavy snow of 7 inches or greater within the next 12 hours, or 9 inches or greater within the next 24 hours, is expected as a result of cold, unstable air flowing over the Great Lakes, and affecting any portion of Albany's County Warning Area. This "lake-effect" snow will fall in localized bands primarily south and east of lakes Erie and Ontario. Snowfall rates of several inches per hour, and white-out conditions (visibilities near zero caused by heavy snowfall) are possible.

WINTER STORM WARNING FOR FREEZING RAIN - Damaging accumulations of ice (generally ½ inch or more) can be expected to take down numerous tree limbs and power lines. Any form of outdoor travel becomes treacherous.

BLIZZARD WARNING - Issued when the following conditions are expected: Three hours or more of considerable falling and/or blowing snow with visibilities frequently less than one-quarter mile combined with sustained winds or frequent gusts of 35 miles per hour or more.

FREEZE WARNING - Issued when the surface air temperature is expected to remain at 32 degrees or lower over a wide area for a climatologically significant period of time. Used during the growing season when the temperature is expected to become low enough for a sufficient duration to kill all but the hardiest herbaceous crops.

WIND CHILL WARNING - Issued for conditions of extreme cold, when wind chill equivalent temperatures are expected to be minus 30 degrees or lower (minus 25 degrees or lower south of Albany) for a period of three hours or longer.

OTHER WARNINGS issued by WFO Albany include:

FLASH FLOOD WARNING - Rapid onset of flooding due to excessive rainfall, ice jams, dam breaks, etc. Tends to occur mostly in areas with a significant degree of sloping terrain.

FLOOD WARNING - Inundation of normally dry areas will occur due to excessive rainfall, snow melt, ice jams, etc. This will occur over a longer period of time than with a flash flood.

HIGH WIND WARNING - Issued when either of these two events are expected to occur for a period of one hour or longer over a wide area: Sustained winds of at least 40 miles per hour, or; frequent wind gusts of at least 58 miles per hour.

WINTER WEATHER ADVISORIES

These are issued when a weather event falls short of warning criteria. They include:

WINTER WEATHER ADVISORY FOR SNOW - Four to 6 inches of snow are expected to accumulate within a 12-hour period.

LAKE EFFECT SNOW ADVISORY - The same as a Winter Weather Advisory For Snow, except that lake-effect snow bands are expected. This generally occurs in the “lake-effect snow belt” south and east of lakes Erie and Ontario.

WINTER WEATHER ADVISORY FOR BLOWING SNOW - Visibilities will be significantly reduced on a widespread basis due to blowing snow. The blowing and drifting of the snow will also make driving hazardous.

WINTER WEATHER ADVISORY FOR FREEZING RAIN (or FREEZING DRIZZLE) - Ice accumulations of less than ½ inch are expected to cause hazardous travel, but not the widespread downing of tree limbs and power lines as with a major ice storm.

WIND CHILL ADVISORY - Wind chill equivalent temperatures are expected to be 20 degrees below zero or lower (15 degrees below zero or lower south of Albany) for at least 3 hours.

A generic WINTER WEATHER ADVISORY will be issued when there is any combination of the preceding weather conditions.

OTHER ADVISORIES issued by WFO Albany include:

WIND ADVISORY - Sustained winds of 31 to 39 miles per hour, or frequent gusts from 46 to 57 miles per hour, are expected over a wide area for at least 1 hour.

DENSE FOG ADVISORY - Issued when fog is expected to reduce visibilities to 1/4 mile or less on a widespread basis.

FROST ADVISORY - Issued during the growing season for scattered areas of frost, before the first killing frost occurs. Frost is not expected to be as widespread as with a Frost Warning. Can occur even when air temperatures are within a few degrees above freezing.

STATEMENTS ISSUED BY NWSFO ALBANY

SEVERE WEATHER STATEMENT - Brief statement used to: describe any urgent threat to life or property; report damage; cancel warnings, or; extend severe weather watches for another hour or two.

FLOOD AND RIVER STATEMENT - These statements are issued every 1 to 3 hours to update the status of Flood and Flash Flood watches and warnings. They also contain information on when and where flooding will occur, as well as the expected levels and crests of area rivers and streams.

SPECIAL WEATHER STATEMENT - Used to: describe short-term near-severe storms; cancel a watch, or; clear no-longer-threatened areas of a watch. Also issued as an outlook to alert the public to potentially hazardous weather conditions well in advance (6 hours to several days) of their expected occurrence.

FORECASTS ISSUED BY NWSFO ALBANY

SHORT TERM FORECAST (NOW)
The NOW is the primary way of providing event-driven short-term forecast information on meteorological and hydrological conditions to the public and other users. The NOW gives a concise, highly specific forecast, in plain language, of any significant weather expected over eastern New York and western New England in the very near future. NOW's are up to 3 hours in duration, and are event-driven, meaning that they are not issued during benign weather periods. Events include but are not limited to: measurable precipitation episodes; significantly reduced visibilities; significant winds; thunderstorms; icy travel, and; significant temperature changes. A listing of the specific NOW issuance criteria is at the end of this section.

The NOW utilizes all available information from advanced technologies such as the WSR-88D Doppler radars, satellite imagery, lightning detection systems, and the Automated Surface Observing System (ASOS), keeping the public abreast of when and where measurable liquid, freezing or frozen precipitation will begin or end, how heavy it will be, and how much it's likely to accumulate. In an alternate 'bullet' format, these forecasts convey up-to-date information on developing near-severe weather, including: thunderstorms with small hail or high winds, and; minor flooding.

NOW ISSUANCE CRITERIA - Precipitation - Measurable liquid, freezing or frozen is occurring or expected.
Visibility - 1/4 mile or less in fog or haze is occurring or expected.
Winds - 31 mph or greater, or gusts of 46 mph or greater, are occurring or expected.
Thunderstorms - Are occurring or expected.
Freezing rain or icing conditions - Is occurring or expected.
Temperature - Is expected to change significantly.
River - Reaches or exceeds 3/4 bankfull due to run-off or snow melt.
Winter-related advisory or warning - Is in effect.
Other - As judged by the Lead Forecaster.

ZONE AND STATE FORECASTS

WFO Albany issues near- and long-term weather forecasts to the general public (primarily via the news media) through two products: the zone forecast and the state forecast. ZONE FORECASTS are issued for climatologically similar regions, or zones, throughout WFO Albany's CWA (See Figs. 1 and 2). They cover a period of up to 7 days, and include expected weather conditions, probability of precipitation, maximum and minimum temperatures, and wind direction and speed, for all or part of the period. They are issued regularly twice a day: by 4:30 AM, and; by 4:30 PM, and are updated during the day whenever necessary.

WFO Albany uses the standard NWS Service FLEX-ZONES concept. Each county is assigned a zone number. Some counties are divided into 2 zones. As a result, WFO Albany issues forecasts for 34 zones. FLEX-ZONES allow for great detail and specificity of forecasts, warnings and statements affecting each zone within the forecast area. A map showing the present zone number configuration for the CWA has been included as Figure 2.

The tabular STATE FORECAST contains general weather conditions, high and low temperatures,

and precipitation probabilities expected across central, northern and eastern New York through 7 days. It is issued twice daily: by 6:00, AM and PM.

OTHER PRODUCTS

Some of the other products routinely issued by WFO Albany include:

NEW YORK STATE WEATHER ROUNDUP - This is an hourly product containing the current weather conditions at various locations throughout New York State and Vermont. Included are: sky condition; temperature; dewpoint; relative humidity; wind speed and direction; barometric pressure, and; any remarks. This is routinely issued 10 minutes after every hour.

REGIONAL WEATHER SUMMARY - This is a narrative summary of weather during the past 24 hours, plus a map discussion synopsis discussing weather systems (storms, fronts, etc.) affecting New York and Vermont. It is issued twice daily: by 5:30, AM and PM.

DAILY CLIMATOLOGICAL SUMMARY - This gives a statistical summary of the previous day's weather. Included are: the daily maximum, minimum, average and record temperatures; daily, monthly and yearly precipitation; heating and cooling degree day information; average wind and peak wind data, and; sunrise/sunset information. Temperature, precipitation and degree day data is all compared to normal. The summary is issued daily by 3:00 AM. By 5:00 PM each day, a preliminary Daily Climatological Summary, summarizing the day thus far, is issued.

RECORD EVENT REPORT - Issued whenever an Albany daily temperature, precipitation or snowfall record is broken or tied. It is a brief narrative detailing the new record.

Appendix II is a listing of the above product identifiers.

HOW THE INFORMATION GETS OUT

WFO Albany disseminates weather forecasts, warnings and other information directly to the residents of eastern New York and western New England via weather radio, the media (newspapers, television, radio, etc.), and emergency management officials. This is accomplished through various dissemination systems. The 4 primary ones are: NOAA Weather Radio (NWR); the Emergency Managers Weather Information Network (EMWIN); the New York State Police Information Network (NYSPIN), and; the NOAA Family Of Services (FOS). Five others will also be discussed.

NOAA WEATHER RADIO (NWR)

Using a modern computerized voice automation system, forecast, warning and other weather information is broadcast 24 hours a day, 365 days a year from WFO Albany. This information is tailored to apply to specific geographical regions by dissemination through eight separate NWR transmitter stations: WXL-34 (162.55 MHz), from New Scotland, in Albany County, New York; WXL-37 (162.475 MHz), from Highland, in Ulster County, New York; WWF-48 (162.525 MHz), from Adams, in northern Berkshire County, Massachusetts; WXM-68 (162.425 MHz), from Marlboro, in Windham County, Vermont; WXM-82 (162.45 MHz), from Sheffield, in southern

Berkshire County, Massachusetts; WXM-45 (162.425 MHz), from Middleville, in Herkimer County, New York; WWH-33 (162.5 MHz), from Cornwall, in Litchfield County, Connecticut; and the newest station, KSC-43 (162.450 MHz), from Johnsburg, in Warren County, New York. The two Massachusetts transmitters broadcast identical information.

WFO Albany broadcasts severe and winter weather warnings, watches and advisories, detailing hydrometeorological events such as tornadoes, floods, high winds, blizzards and ice storms, along with other meteorological phenomena. In addition, background information concerning the storm and appropriate safety tips are included with the warning. Short Term Forecasts (NOWs) and Severe Weather Statements (SVSs) keep listeners informed and updated on storm progress, and the status of watches, warnings and advisories that are in effect.

Daily weather forecasts and NOWs make up the majority of NWR programming. The local NWR Service Area Forecast (SAF) encompasses the eastern Mohawk and Hudson valleys, Bennington and Windham Counties of Vermont, Berkshire County, Massachusetts, and Litchfield County, Connecticut. Also included is a Traveler's Forecast, designed for people traveling in eastern New York and New England.

NWR program content is seasonally adjusted to accommodate a vast array of changing needs. These include a warm-season Boat and Beach Forecast, designed for those who enjoy outdoor summer activities such as hiking, camping, hunting, fishing, boating and sun-bathing. Other specific weather information in the broadcast program include: the Daily Climatological Summary; hourly weather conditions for Albany, Glens Falls, Poughkeepsie, and other northeastern cities; and other miscellaneous information, such as weather preparedness and safety tips, and answers to frequently asked weather-related questions posed by NWR listeners.

Many of NWR's listeners have weather radios equipped with a warning alarm. Special tones are transmitted during hazardous weather situations when any of a variety of watches and warnings are issued for a particular area. Weather radio receivers equipped with this warning alarm feature sound a tone for 5 seconds to alert listeners. Shortly after the alarm, a weather watch or warning is broadcast, often followed by safety tips. An NWR warning alarm test is normally conducted every Wednesday, usually between 11 AM and Noon, unless severe weather threatens. In this case, the test is postponed until the first available fair weather day.

In addition, Specific Area Message Encoder (SAME) technology allows NWS warning messages to be sent to only the specific county(ies) involved, rather than to all counties within a transmitter's range, as had previously been the case. With this technology, only selected receivers are activated with alert tones. All other receivers within the range of the transmitter, but outside of areas being affected by the hazardous weather, are not activated. For more specific information concerning NWR programming, please refer to the detailed program schedule (Appendix III), and the detailed NWR transmitter coverage map (Fig. 3).

NOAA Weather Radio receivers can be purchased at many retail stores that sell electronic merchandise, including stand-alone retail outlets, electronics departments within some department stores, and some drug stores. They can also be purchased through some mail-order catalogs. Persons with marine interests may be able to purchase receivers where boat and marine accessories are sold.

EMERGENCY MANAGERS WEATHER INFORMATION NETWORK (EMWIN)

Developed in partnership with the Federal Emergency Management Agency (FEMA) and other public and private organizations, EMWIN is the primary satellite communications network between the NWS and emergency management officials. It is a free service which transmits products via satellite to users, thus providing a continuous stream of weather information. A list of commercial EMWIN hardware and software vendors is available at the following web address: iwin.nws.noaa.gov/emwin/winven.htm.

NEW YORK STATE POLICE INFORMATION NETWORK (NYSPIN)

A two-way electronic interface has been established between NYSPIN and the NWS. The interface permits high speed delivery of weather information between the NWS and more than 2,000 law enforcement and emergency management terminals across the state. A full suite of NWS text products, particularly those issued before and during hazardous hydrometeorological events, is available via this system. Critical information contained in warnings, watches, statements and advisories is automatically and rapidly routed to individual counties threatened by the event. In turn, the New York State Police are able to transmit post-storm and road reports to the NWS for further distribution via the NOAA Weather Wire Service (See.) to the media.

The communications link makes it possible to send civil emergency messages, such as hazardous materials spills and dam break notifications, through the NWS communications systems, to the media and public.

As a vital component of the hazard and warning preparedness community, the NWS, as well as federal, state, and local emergency management officials, depend on the electronic media for accurate and timely relay of critical weather information.

NOAA FAMILY OF SERVICES (FOS)

Since 1983, the NWS has provided, for external user access to weather information, a suite of data services called the Family Of Services. The individual data services may be obtained by private sector companies from the NWS upon payment of a one-time connection charge, plus an annual fee which is dependent upon the level or number of services desired. The companies then re-sell data as received and/or provide value-added services based on information derived from the FOS. More information on this service is available by contacting Ms. Julie L. Hayes, the Program Manager, at (301) 713-0864, ext. 120. or by email at julie.hayes@noaa.gov.

NOAA WEATHER WIRE SERVICE (NWWS)

The NWWS is the primary satellite communications network between the NWS as a whole and its mass media and emergency management users. It is a service provided by a contract vendor who receives a fee from the NWS, as also from subscribers to the service. It functions in a fashion similar to that of EMWIN, providing a full suite of text products to its users, It provides the most reliable and timely warning delivery system available from the NWS. More information about this subscription service can be obtained by calling the government's contractor for it, DynCorp, at 1-800-633-2340, or by accessing their website at: dynis.is.dyncorp.com.

EMERGENCY ALERT SYSTEM (EAS)

The EAS is a nationwide alerting system requiring all broadcast stations (radio and television), cable television, and wireless cable systems to have FCC type-certified EAS equipment. The FCC manages the EAS, in partnership with FEMA (or its equivalent) and the NWS. Participation by the electronic media to receive, forward to other EAS participants, and rebroadcast emergency messages to the public is mandatory for national-level EAS alerts, and voluntary for state and local messages, such as weather or other environmental emergencies.

The EAS equipment uses a precisely-formatted digital protocol, including a two-tone attention signal. This signal defines the nature of the event or the emergency, its location, the party that originated the message, the valid time of the emergency, and an end-of-code message. This EAS protocol is virtually identical to the NWR Specific Area Message Encoding (SAME) technique the NWS uses to broadcast messages over all NWR stations. (See NOAA WEATHER RADIO.)

The NWS is a key provider to the EAS in two ways. NWS sends certain time-critical emergency audio messages using SAME via NWR to EAS participants. It also sends similar products in text format, using highlighted "EAS ACTIVATION REQUESTED" terminology, through satellite driven systems such as NWWS, FOS, EMWIN and NOAAPORT (See.).

NWS WFO's are active participants in state and local EAS plans in their areas, as conducted by State Emergency Communications Committees (SECC) and Local Emergency Communications Committees (LECC). Within each state, one NWS WFO is designated the state liaison office, to coordinate with state emergency management and broadcasters. While it is understood that the relay of state/local information by broadcasters is optional, it is typically in these EAS plans that SECC/LECCs recommend how the voluntary participants should respond to weather and other environmental emergencies. The EAS rules can be found on the internet at: www.fcc.gov/eb/eas.

NATIONAL WARNING SYSTEM (NAWAS)

NAWAS is a network of telephone circuits connecting state and Federal warning points throughout the United States, and it is funded by FEMA. At WFO Albany, it serves primarily as a back-up for NYSPIN and other state law enforcement communications systems.

INTERACTIVE WEATHER INFORMATION NETWORK (IWIN)

Similar in content to EMWIN, IWIN contains real-time warnings and many routine NWS products. It is a free service, requiring only access to a computer and the internet. The data can be accessed at: iwin.nws.noaa.gov.

NOAAPORT

The NOAAPORT broadcast system provides a one-way broadcast communication of NOAA environmental data and information in near-real-time to NOAA and external users. This broadcast service is implemented by a commercial provider of satellite communications utilizing C-band. More information is available at the NOAAPORT user's webpage at: 205.156.54.206/noaaport/html/noaaport.shtml.

MODERNIZATION OF THE NWS

The NWS continues an ongoing modernization based on new technology and knowledge in the sciences of meteorology and hydrology. Recent advances in satellite systems, Doppler radar, sophisticated information processing systems, ASOS and super-speed computers are the basis for more timely and precise severe weather warnings and forecasts for the nation.

With much of this new technology in place, residents across eastern New York and western New England are receiving the following:

More timely warnings, and better forecasts of winter storms that claim life and property.

Earlier, and more reliable and site-specific warnings of flash floods, the number one cause of weather-related deaths.

More timely and reliable site-specific warnings of severe thunderstorms and tornadoes. With the new technology, up to 30 minutes of lead time for warnings of major tornadoes is possible.

Improved warnings of general flooding events for people living in cities and river valleys.

Fewer false alarms of severe weather, resulting in heightened public confidence in weather warning services.

Improved long-range routine forecasts (beyond 10 days), better serving a variety of interests.

DOPPLER WEATHER RADAR

The technological keystone of the National Weather Service modernization is the Weather Surveillance Radar -1988 Doppler (WSR-88D). The WSR-88D excels in detecting the severe weather events that threaten life and property, from the early detection of damaging winds, to estimating rainfall amounts for use in river and flood forecasting. Most importantly, the WSR-88D increases advance warning, and the specificity of such warnings, for short-lived, often catastrophic events, such as flash floods and tornadoes.

Using Doppler technology, WSR-88D computers calculate both the speed and direction of motion of severe storms. By providing data on wind patterns within developing storms, the Doppler identifies the conditions leading to severe weather such as tornadoes. This translates to earlier detection of precursors to tornadoes, as well as data on the direction and speed of tornadoes, once formed.

The NWS Albany WSR-88D, located in the town of Berne in southwest Albany County, has already proven itself in severe weather applications. On Memorial day, May 29, 1995, the Doppler was instrumental in allowing forecasters to issue advance tornado warnings for Columbia and Berkshire Counties. Also, on July 15, 1995, a large severe thunderstorm complex, known as a derecho, swept across eastern New York and western New England, causing widespread wind damage. Using the WSR-88D, severe thunderstorm warnings with 30 minute average lead times were successfully issued for all 19 counties served by WFO Albany. More recently, with the Severe Thunderstorm And Tornado Outbreak of May 31, 1998, the average lead time for all warnings was 22 minutes, and 46 of the 48 warnings issued were verified. The warning for the Stillwater-Mechanicville tornado in Saratoga County, New York had a lead time of 42 minutes.

The WSR-88D has also shown its superiority in winter weather applications. The new radar is much more sensitive than conventional radars, allowing it to better 'see' into winter storms, with a resultant greater capability of identifying areas of heavy snow and lake-effect snow squall bands.

AUTOMATED SURFACE OBSERVING SYSTEMS (ASOS)

The automated surface observing systems serve as the nation's primary surface weather observing network. These modern systems automate observing functions which had traditionally been carried out by about 1,200 full- and part-time employees at some 260 NWS facilities. This network more than doubles the number of full-time surface weather observing locations. ASOS works non-stop, updating observations 24 hours a day, 365 days a year.

The ASOS units acquire, process, store and distribute temperature, pressure, wind speed and direction, cloud cover and other data. The information flows directly to the weather offices, as well as to local air traffic control towers. A computer-generated voice broadcasts weather information directly to pilots near the airport. Fig. 4 is a map of the regional METAR (Aviation Routine Weather Report) sites, most of which are ASOS reporting stations.

Being able to get more data on the atmosphere more frequently and from more locations is the key to improving forecasts and warnings. Thus, ASOS helps the NWS better the accuracy and timeliness of its forecasts and warnings.

AUTOMATED UPPER-AIR OBSERVATIONS

Upper-air observations are collected twice daily from over 100 U.S., Canadian and Caribbean sites (Fig. 5) with balloon-borne sensors, which are capable of being recovered, refurbished and reused. Eventually, these observations may be replaced by a ground-based network of atmospheric-sensing radars. This national network, known collectively as Wind Profilers, develop high-quality upper-air soundings of wind speed and direction at short intervals measured in minutes. The data they generate is fed into numerical computer weather models, which is then used by forecasters to produce more accurate weather forecasts.

NEW SATELLITE SYSTEMS

Two geostationary (GOES) weather satellites are normally positioned over the equator to provide a broad view of the United States, its coastal waters, and the Atlantic and Pacific breeding grounds for winter storms and hurricanes. GOES-8 became operational in 1994 and is performing the GOES-EAST operations at 75°W longitude. GOES-10 is currently the GOES-WEST satellite at 134.78°W longitude.

Operational meteorologists have more accurate wind fields of the ocean areas, more frequent satellite precipitation estimates, and images over the continental U.S. every 15 minutes, to monitor the development of severe thunderstorms. GOES also sends products such as night- time fog detection imagery to NWS offices, and merges hourly cloud information with ASOS.

ADVANCED WEATHER INFORMATION PROCESSING SYSTEMS (AWIPS)

The Advanced Weather Information Processing System (AWIPS), a multi-graphic system which enables forecasters to extract, assimilate and quickly display products from a diverse set of observational and forecast model data, has been operational since the late 1990s. Commercial communications links between NWS offices and its national weather centers ensure speedy data transmissions. Through NOAAPORT, products are made available to the news media and other weather information users.

RELOCATION OF WFO ALBANY TO THE SUNY-ALBANY CAMPUS

In 1997, the Albany Forecast Office relocated to the campus of SUNY-Albany. This move provided expanded facilities for housing new equipment and information processing computers of the new Weather Service Forecast Office. New weather technology in an academic environment has led to an increase in cooperative research, with the Atmospheric Sciences Department faculty and students, as well as with the Atmospheric Science Research Center. That research has, in turn, resulted in further improvements in weather forecasts and warnings.

APPENDIX A.

ZONES IN WFO ALBANY'S COUNTY WARNING AREA OF FORECAST RESPONSIBILITY

(Zones are in New York state except where indicated)

ZONE NO.	PREFIX	COUNTY
CT001	northern	LITCHFIELD, **CONNECTICUT**
CT013	southern	LITCHFIELD, **CONNECTICUT**
MA001	northern	BERKSHIRE, **MASSACHUSETTS**
MA025	southern	BERKSHIRE, **MASSACHUSETTS**
NY032	northern	HERKIMER
NY033		HAMILTON
NY038	southern	HERKIMER
NY039	southern	FULTON
NY040		MONTGOMERY
NY041	northern	SARATOGA
NY042	northern	WARREN
NY043	northern	WASHINGTON
NY047		SCHOHARIE
NY048	western	SCHENECTADY
NY049	eastern	SCHENECTADY
NY050	southern	SARATOGA
NY051	western	ALBANY
NY052	eastern	ALBANY
NY053	western	RENSSELAER
NY054	eastern	RENSSELAER
NY058	western	GREENE
NY059	eastern	GREENE
NY060	western	COLUMBIA
NY061	eastern	COLUMBIA
NY063	western	ULSTER
NY064	eastern	ULSTER
NY065	western	DUTCHESS
NY066	eastern	DUTCHESS
NY083	southern	WARREN
NY084	southern	WASHINGTON
VT013		BENNINGTON, **VERMONT**
VT014	western	WINDHAM, **VERMONT**
VT015	eastern	WINDHAM, **VERMONT**

APPENDIX B.
LIST OF SELECTED PRODUCT IDENTIFIERS

PRODUCT	NWWS ID	WMO HEADER
WATCHES		
SEVERE THUNDERSTORM	ALBSLSNY	WWUS61 KALB
TORNADO	ALBSLSNY	WWUS61 KALB
FLOOD	ALBFFAALY	WGUS61 KALB
SUMMER WEATHER WARNINGS		
SEVERE THUNDERSTORM	ALBSVRALY	WUUS51 KALB
TORNADO	ALBTORALY	WFUS51 KALB
FLASH FLOOD	ALBFFWALY	WGUS51 KALB
FLOOD	ALBFLWALY	WGUS41 KALB
WINTER WEATHER WARNINGS		
WINTER STORM (WATCH or WARNING)	ALBWSWALY	WWUS41 KALB
WINTER STORM WARNING FOR FREEZING RAIN	ALBWSWALY	WWUS41 KALB
BLIZZARD WARNING	ALBWSWALY	WWUS41 KALB
HIGH WIND	ALBNPWALY	WWUS71 KALB
ADVISORIES		
WINTER WEATHER	ALBWSWALY	WWUS41 KALB
SNOW/BLOWING SNOW	ALBWSWALY	WWUS41 KALB
FREEZING RAIN/DRIZZLE	ALBWSWALY	WWUS41 KALB
WIND CHILL	ALBWSWALY	WWUS41 KALB
WIND	ALBNPWALY	WWUS71 KALB
FOG	ALBNPWALY	WWUS71 KALB
STATEMENTS		
SEVERE WEATHER	ALBSVSALY	WWUS51 KALB
SPECIAL WEATHER	ALBSPSALY	WWUS81 KALB
FLASH FLOOD	ALBFFSALY	WGUS71 KALB
FLOOD	ALBFLSALY	RGUS81 KALB
RIVER	ALBRVSALB	FGUS81 KALB
OTHER PRODUCTS		
ZONE FORECASTS	ALBZFPALY	FPUS51 KALB
STATE FORECAST	ALBSFPNY	FPUS61 KALB
SHORT TERM FORECAST	ALBNOWALY	FXUS71 KALB
DAILY CLIMATE SUMMARY	ALBCLIALB	CDUS41 KALB
REGIONAL WEATHER SUMMARY	ALBRWSALB	AWUS41 KALB
WEATHER COLLECTION	ALBSWRNY	ASUS41 KALB
SEVERE WEATHER OUTLOOK	ALBOPUALB	FPUS81 KALB
RECORD EVENT REPORT	ALBRERALB	SXUS99 KALB

APPENDIX C.

NOAA WEATHER RADIO

NORMAL DAILY PROGRAMMING

CURRENT TIME

BRIEF STATION IDENTIFICATION - EACH CYCLE

HOURLY WEATHER ROUNDUP

WEATHER SYNOPSIS & LOCAL FORECAST (OUT TO 7 DAYS) - CONTINUOUSLY

TRAVELERS FORECAST - 6 AM TO 2 PM; 6 PM TO 2 AM

CLIMATE INFORMATION - 3 AM TO 9 AM

FULL STATION IDENTIFICATION - EVERY 30 MINUTES

WEDNESDAY TONE ALERT TEST - BETWEEN 11 AM & NOON

SUMMER RECREATIONAL AND BEACH FORECAST - 5 PM TO MIDNIGHT

'AS NEEDED' BROADCASTS

SHORT-TERM FORECASTS - UP TO 3 1/2 HOURS FOR UPCOMING WEATHER

PUBLIC INFORMATION STATEMENTS

SPECIAL WEATHER STATEMENTS

WEATHER OUTLOOKS

WEATHER ADVISORIES

WEATHER WATCHES

WEATHER WARNINGS

CIVIL EMERGENCIES

RECORD EVENT REPORTS

APPENDIX D.

A WEATHER GLOSSARY

AIR MASS: A large body of air characterized by relatively uniform temperature and moisture.
ALBERTA CLIPPER: A low pressure system that develops over or near Alberta Canada, and moves rapidly east to southeast across the Great Lakes and northeastern U.S.
ALTOCUMULUS: Mid-level clouds in the 6,500 to 16,500 foot range, typically having cellular characteristics or undulations.
ALTOSTRATUS: Mid-level gray clouds in the 6,500 to 16,500 foot range that are fairly continuous and have a relatively flat appearance. They may be thin enough to allow the sun to filter through and form a **halo**.
ANEMOMETER: An instrument that measures wind speed.
ANTICYCLONE: A high **pressure** weather system. Winds rotate clockwise around an anticyclone in the northern hemisphere. It is often associated with fair weather conditions, and in winter, usually with very cold weather. (Compare **cyclone**.)
ANVIL: A fanning-out of high-level ice clouds (**cirrus**) over the top portion of a **thunderstorm**.
ARCTIC HIGH: A high pressure system which originates north of the Arctic Circle. When it moves southeast toward the U.S., it brings very cold weather, especially in winter.
BACKDOOR COLD FRONT: A **cold front** which approaches from the east or northeast. It usually brings cool and somewhat moist conditions.
BAROMETER: An instrument that measures atmospheric **pressure**.
BERMUDA HIGH: A high **pressure** system centered in the western Atlantic Ocean, near Bermuda. Southerly winds circulating around it bring warm and humid air, and sometimes, heat waves.
BLIZZARD: A snowstorm accompanied by winds in excess of 35 mph.
CASTELLANUS: A common form of **altocumulus**, occurring mainly during warmer months, and characterized by puffy whitish tufts. When occurring in the morning, they are usually a sign of atmospheric instability which tends to result in afternoon **shower**s and **thunderstorm**s.
CEILING: The height of the lowest layer of opaque clouds covering more than half of the sky, important to aviation interests.
CHINOOK: A warm, dry westerly wind typically occurring downwind of mountain chains, especially the east side of the Rockies in the U.S. It is most prevalent from late winter through spring.
CIRROCUMULUS: High-level white clouds above 16,500 feet, having a relatively uniform appearance like that of cauliflower.
CIRROSTRATUS: High-level ice clouds above 16,500 feet, having a usually thin, smooth appearance.
CIRRUS: High-level wispy white clouds made up of ice crystals, and occurring at altitudes from 16,500 to 45,000 feet.
COLD FRONT: The boundary between advancing cold air and the warm air which it is replacing. A cold frontal passage is often preceded by **shower**s or **thunderstorm**s, falling air **pressure**, and a sudden wind shift, generally from a southerly direction to a more westerly or northerly direction. (Compare **Warm Front**.)
COLD SNAP: The sudden onset of a significant period of sub-freezing temperatures.
COLD WAVE: A period of 3 or more consecutive days with low temperatures of zero degrees or lower. (Compare **Heat Wave**.)
CORONA: One or more small prismatically colored rings around the sun or moon as seen through a thin cloud made up entirely of liquid water droplets. (Compare **Halo**.)
CREPUSCULAR RAY: One of several yellow to orange streaks which appear to fan out from the sun's surface at the horizon during sunrise or sunset, or from the sharp edge of a nearby cloud.

CUMULONIMBUS: A **cumulus** cloud with great vertical development, sometimes capped by an **anvil**. Often extensive enough to be referred to as a "thunderhead", these clouds frequently produce **thunderstorm**s and heavy rain.
CUMULUS: Generally white clouds with gray bases under 13,500 feet, having an individual, puffy, cellular appearance. They are typically associated with fair weather, but can produce showers when large and well-developed.
CUMULUS FRACTUS: Ragged, gray clouds of under 6,500 feet resembling shredded cumulus. They are often associated with showers or thunderstorms.
CYCLONE: A low **pressure** weather system, or storm. Winds rotate counter-clockwise around a cyclone in the northern hemisphere. It generally produces cloudy, rainy or snowy weather.
DEGREE DAY: The difference between the average daily temperature and 65 degrees. When the average temperature is greater than 65, the difference is called cooling degree days (CDD). If it is less than 65, it is referred to as heating degree days (HDD).
DEW: Sweat-like beads of water which condense out of the air onto objects near the ground. (Compare **Frost**.)
DEW POINT: The temperature to which the air must be cooled at any given moment in order for water vapor or dew to condense out of it.
DOWNBURST: A strong localized downdraft of air, usually from a **thunderstorm** cloud.
DRIZZLE: Precipitation of very small water droplets resembling a fine mist, usually coming from **stratus** clouds. The drop size of drizzle is much smaller than that of **rain**.
DRY LINE: A boundary, most common during spring and early summer, and occurring mainly anywhere from west Texas to South Dakota, dividing warm, moist air from the Gulf of Mexico on the east side, and hot, dry southwest winds from the Sonoran desert region of Mexico on the west side. Severe **thunderstorm**s and **tornado**es are common when the boundary advances east during the daytime.
DRY SPELL: A period of 14 or more consecutive days with no more than a trace of precipitation.
DUST DEVIL: A small-scale whirlwind typically occurring under hot, dry conditions with light winds. It is most common in the southwestern U.S. Much weaker than a tornado, it occurs usually under cloudless conditions and does little damage. Sometimes one will form in a field, move a short distance, dissipate, and repeat many times.
EL NIÑO: An atypical global atmospheric pattern caused by anomalous warming of the eastern Pacific Ocean by at least 3 degrees. It tends to result in drought conditions affecting some areas, and unusual stormy and wet conditions affecting others. (See **La Niña**)
EQUINOX: The time which marks the beginning of spring or autumn. The day that the equinox occurs has almost exactly 12 hours of daylight and darkness.
FLOCCUS: A form of **altocumulus** cloud, whitish in color, and having a blotchy appearance as if a flat object were lifted off of a freshly-painted surface. It is a sign of moderate instability.
FOG: A **stratus** cloud in contact with the ground.
FREEZING RAIN OR DRIZZLE: Precipitation which falls as a liquid but freezes on contact with the ground or objects near the ground with the temperature below freezing.
FROST: Small ice crystals which form when water condenses onto objects near the ground at below freezing temperatures. (Compare **Dew**.)
FUNNEL CLOUD: A violently rotating column of air aloft, extending downward, usually from the base of a **thunderstorm** cloud. If and when it touches the ground, it becomes a **tornado**.
GALE: A wind of speeds between 39 and 54 miles per hour.
GROWING DEGREE DAY: The difference between the average daily temperature and 50 degrees. If this difference is greater than zero, it is called a growing degree day (GDD). When the average temperature is less than 50, there are zero GDDs. For corn GDD's, average daily temperatures over 85 degrees default to zero GDD's.
GUST: A brief, sudden increase in wind speed.
HAIL: Precipitation which falls in the form of lumps or balls of ice, in association with

thunderstorms. Hail can be as large as 5 inches in diameter.
HALO: A colored or whitish ring or arc about the sun or moon when seen through an ice crystal cloud or falling ice crystals. They may be of several sizes. (Compare **Corona**.)
HAZE: Fine particles of dust suspended in the air, reducing visibility.
HEAT WAVE: A period of 3 or more consecutive days with high temperatures of 90 degrees or higher. (Compare **Cold Wave**.)
HURRICANE: A very intense storm which forms in the tropics, producing sustained winds of at least 74 miles per hour.
ICE NEEDLES: Cloudless **precipitation** resembling **snow grains**, condensing out of the air as ice crystals near ground level. It occurs during very cold days or nights (below 18 degrees).
INDIAN SUMMER: A period of warm weather in the fall which comes after a period of cool weather, usually after the first **frost** of the season.
INVERSION: A layer of increasing temperature with height. Such a scenario is needed for **freezing rain** to occur. A strong inversion during the morning hours usually delays cloud dissipation.
JET STREAM: A band of strong winds concentrated in the upper atmosphere, which can sometimes be seen as streaks within **Altocumulus** clouds. The jet stream runs perpendicular to the streaks.
KNOT: One nautical mile per hour, equal to 1.15 statute (land) miles per hour.
LA NIÑA: A reverse pattern of **El Niño**, whereby the Pacific ocean is cooled, and the areas experiencing unusual drought and inundating rainfall under El Niño is somewhat reversed.
LAKE-EFFECT: Precipitation, usually in the form of **snow** or **sleet**, produced as a result of a long fetch of cold wind picking up moisture across open water, and condensing it out over land. The great lakes commonly produce lake-effect precipitation, especially during the colder months.
LANDSPOUT: A true waterspout which moves onto land. While typically not as strong as a tornado, it is related to it and is often referred to as one once it reaches land.
LIGHTNING: The electrical discharge from a **thunderstorm** cloud.
MAMMATUS: Smooth, billowy clouds between 6,500 and 45,000 feet, often associated with **thunderstorm**s.
MONSOON: A persistent seasonal weather pattern of above normal winds and rainfall, very pronounced over parts of Asia and Africa, and also occurring over the southwestern U.S. mainly during late summer.
NACREOUS: A very rare, very high altitude (12 to 20 miles), stationary, brightly iridescent cloud, occurring mainly over Alaska and northern Europe, and consisting of mostly frozen ammonia gas. At sunset, the white cloud shows all the colors of the spectrum, then becomes mostly orange, then pink, grey, and finally revealing the colors of the spectrum before fading by 2 hours after sunset. They may be visible all night under moonlight. (Compare **Noctilucent**.)
NIMBOSTRATUS: Usually green-gray to blue-gray clouds which are uniform and flat in appearance, occurring between the surface and 12,000 feet. They are always associated with widespread precipitation, and are often obscured by lower clouds.
NOCTILUCENT: A very rare, extremely high altitude (43 to 56 miles), rapidly-moving summertime cloud resembling pale cirrus, but usually with a silvery or bluish caste that stands out against the sky well into the night. They are visible only between sunset and sunrise, becoming more brilliant into the night, and are believed to be composed of very fine cosmic dust particles. They are most common before sunrise, and occur only across Alaska, Canada, Greenland, northern Europe and Russia. (Compare **Nacreous**.)
NOR'EASTER: A low pressure system which tracks along the east coast of the U.S., usually during the fall and winter. These storms can cause strong northeast winds (hence its name), large waves and beach erosion, and if accompanied by **snow**, **blizzard**s.
OVERRUNNING: A condition where warm moist air rides up and over cooler air at the surface, usually resulting in widespread **precipitation**.

OZONE: A gaseous compound close in chemical structure to Oxygen (O_2), but having an extra Oxygen atom per molecule (O_3). It is typically found in the upper atmosphere, and is produced by the sun's ultraviolet rays, partially shielding the earth from those rays. It can be "washed down" to the surface in thunderstorms.
PRECIPITATION: Liquid or solid water that falls from clouds, and reaches the ground.
PRESSURE: The downward force exerted on a column of air created by the pull of gravity. It can be thought of as the weight of the air at a given height.
RAIN: Precipitation which falls as liquid, whose drops are larger than those of **drizzle**.
RAIN OR SNOW SHADOW: A downwind side of a mountain range which receives little or no **precipitation** during a storm. The upwind sides of mountain ranges receive much more precipitation than the downwind sides because the moisture in the air condenses out as the air rises up the range and dries out as it descends down the lee side of the range.
RELATIVE HUMIDITY: The amount of water vapor actually in the air, compared to how much water vapor the air can hold, expressed in percent.
RIDGE: An elongated area of high **pressure** in the atmosphere.
SANDSTORM: Sand, kicked up by strong winds in hot, dry regions, the result of the passage of a strong cold front. Most common throughout North Africa, where it can be bad enough cause white-out conditions. It tends to be much weaker when it occurs in the desert southwest.
SHOWER: Precipitation that falls intermittently (off and on) and has varying rates of intensity.
SLEET: Precipitation that falls as small ice pellets. Similar in appearance to, but usually much smaller than, **hail**, being only about 1/8 of an inch in diameter.
SNOW: Precipitation made up of ice crystals in the shape of a hexagon.
SNOW DEVIL: An infrequent whirlwind, similar to a dust devil, which develops over snow-covered surfaces where there is temperature differential caused by gently sloping terrain, sunshine and light winds. It is too weak to cause any damage. Most common in the Rockies.
SNOW FLURRIES: Light **shower**s of **snow**, with little or no accumulation.
SNOW GRAINS: Precipitation in the form of frozen **drizzle**.
SNOW PELLETS: A hybrid form of **precipitation** somewhere between **snow** and **sleet**.
SNOW SQUALL: Intense **shower** or band of locally heavy **snow** which is accompanied by gusty winds. Snow squalls which form downwind of the Great Lakes (**lake-effect** squalls) can persist for several hours and produce 6 inches or more of snow in 3 to 6 hours.
SQUALL LINE: A line of **shower**s or **thunderstorm**s, often accompanied by strong, gusty winds and heavy rain.
STATIONARY FRONT: A boundary between air masses, showing little, if any movement.
STEAMSPOUT: A small-scale waterspout that frequently occurs with waterspouts, but, unlike a waterspout, is observed forming from the water surface upward. Usually occurs when cold air moves over warm water in the fall.
STRATUS: A continuous, low-level gray cloud, usually under 3,000 feet, having a very flat or diffuse appearance. It is the cloud most associated with **drizzle**.
STRATUS FRACTUS: Ragged **stratus**, typically associated with either **rain** or stratus dissipating.
SUN DOG: An atmospheric phenomena by which the shadow of an object can be seen on a surface below, surrounded by a **halo**. Usually seen from and of an aircraft on a cloud top.
THUNDER: The sound caused by a **lightning** discharge as it heats the air, causing it to rapidly expand.
TORNADO: A **funnel cloud** which reaches the ground. Its violently rotating winds frequently cause swaths of significant damage. Unlike other whirls, true tornadoes are always associated with thunderstorm clouds. They are most common in the plains, midwest and deep south, and are rare west of the Rocky mountains. They tend to weaken somewhat when they move out over water.
TROPICAL STORM: An intense area of low **pressure** which forms in the tropics, and has sustained winds of 39 to 73 miles per hour.

TROPICAL DEPRESSION: An area of low **pressure** which forms in the tropics, and has sustained winds of 23 to 38 miles an hour.
TROUGH: An elongated area of low **pressure** in the atmosphere.
TYPHOON: A **hurricane** which occurs in the western pacific ocean.
VIRGA: Precipitation falling from a cloud that evaporates before reaching the ground.
WARM FRONT: The boundary between advancing warm air and the colder air which it is replacing. A warm frontal passage is usually preceded by low clouds, steady **rain**, falling air **pressure**, and a gradual wind shift, generally from an easterly direction to south or southwest. (Compare **Cold Front**.)
WATERSPOUT: A rotating column which forms from a cloud when cold air flows over warm water. They usually cause only minor damage. They are relatively common over the Great Lakes, and off the Pacific Northwest coast, where they often stay aloft as cold air funnels. Can also be a true **tornado** which forms or moves out over water, and can potentially produce more damage than a true waterspout. This type is most common in the Gulf of Mexico and off the Florida Keys.
WIND SHEAR: A rapid change of wind speed and/or direction with height or distance.
WIND CHILL: The apparent temperature that the body feels due to the combination of air temperature and wind speed.

SOME PRECIPITATION TERMINOLOGY

POP: Probability of measurable precipitation (at least .01 inches) expressed as a percentage.
LIKELIHOOD OF PRECIP: Probability of precipitation expressed in general terms.

POPs
10-20%-slight chance/isolated/few/widely scattered
30-50%-chance/scattered
60-70%-likely/numerous
80-100%-see terms below widespread
Any or none of the following terms may be used when the probability of precipitation is from 80 to 100 percent:
BRIEF: Some precipitation for a short duration.
OCCASIONAL: Precipitation "now and then" over a few hours.
INTERMITTENT: Precipitation occurring at frequent intervals, or ‘on and off'.

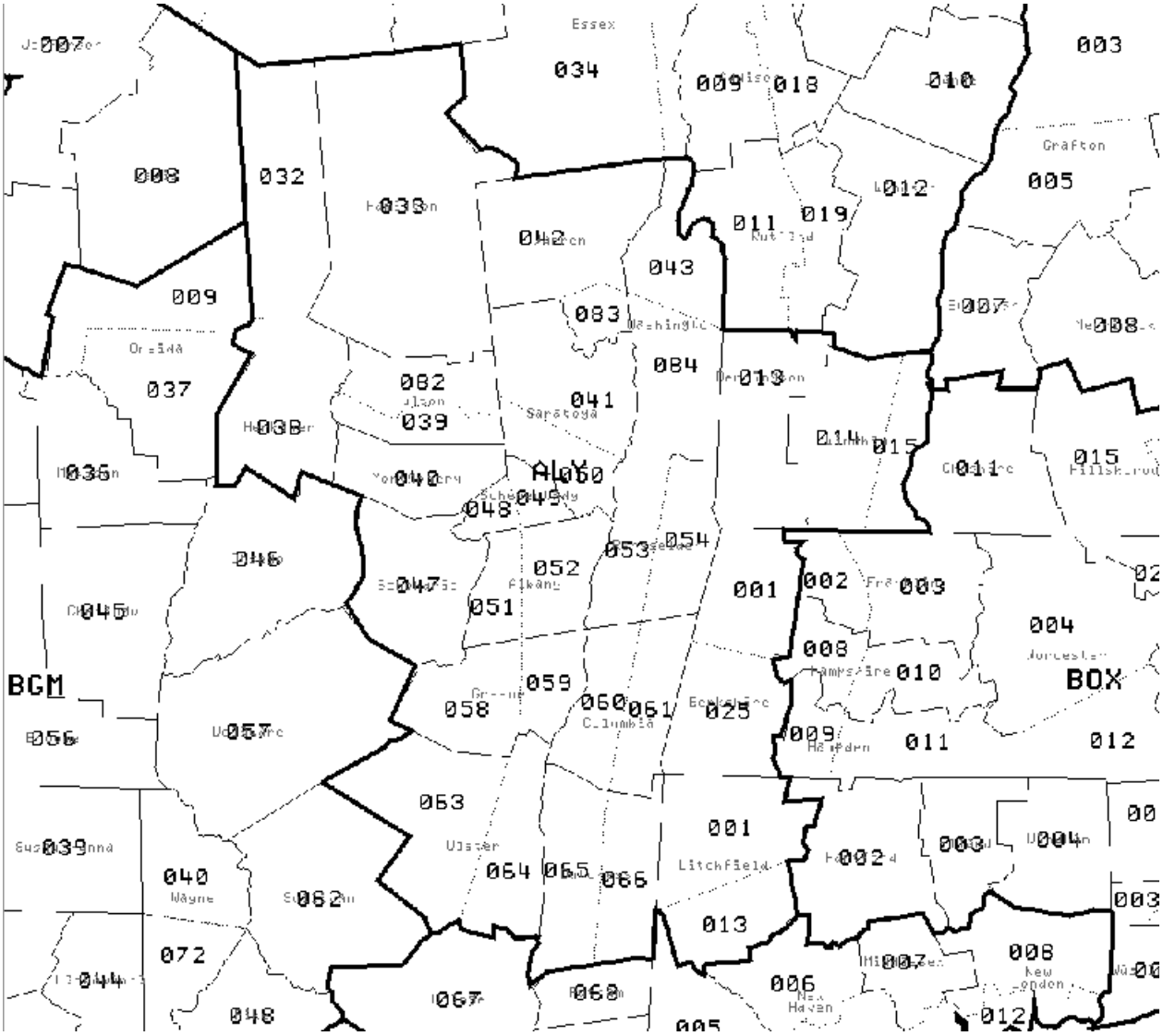

Fig. 1. WFO Albany County Warning Area and surrounding region showing Forecast Zone numbers.

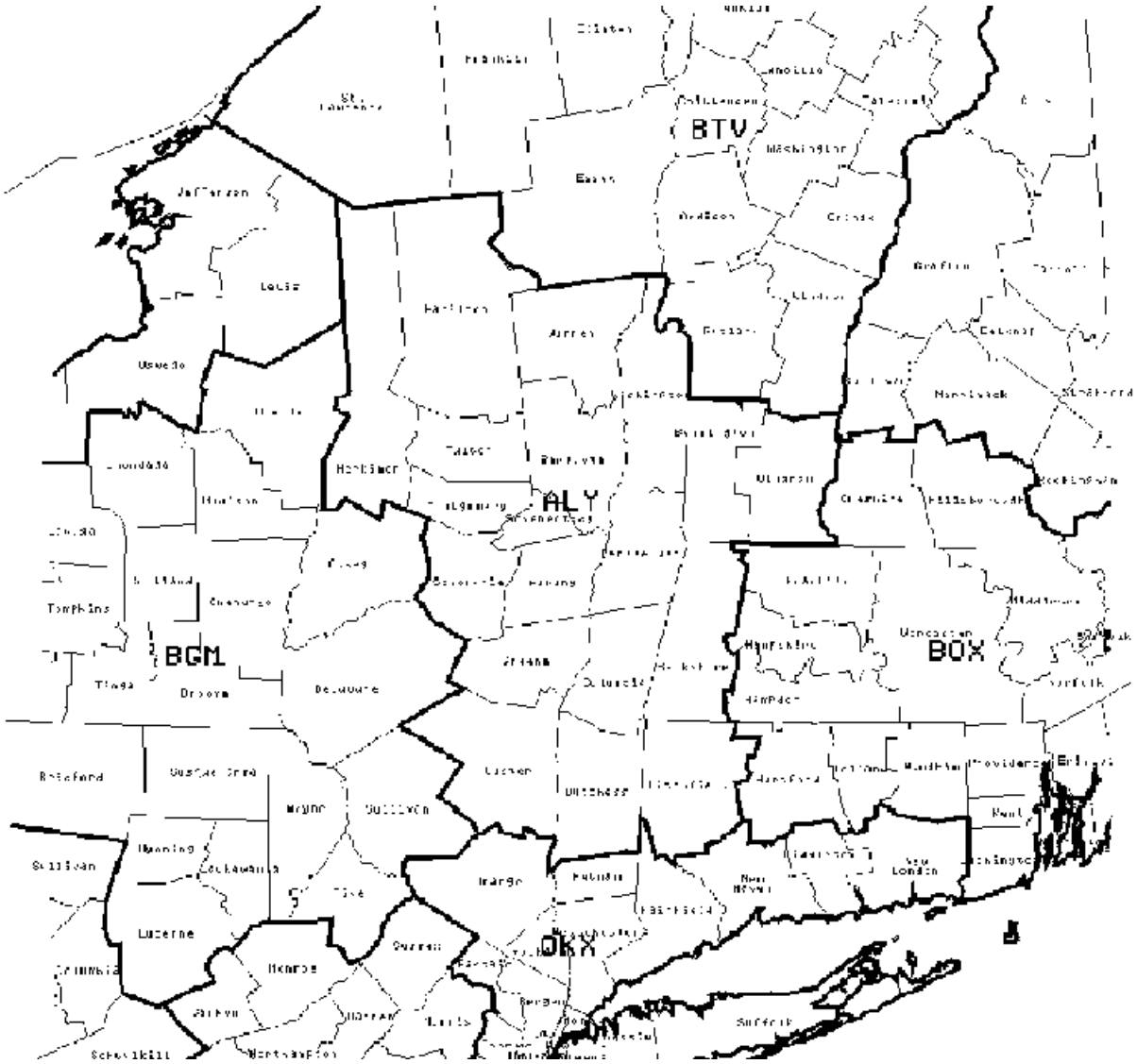

Fig. 2. WFO Albany County Warning Area and surrounding offices.

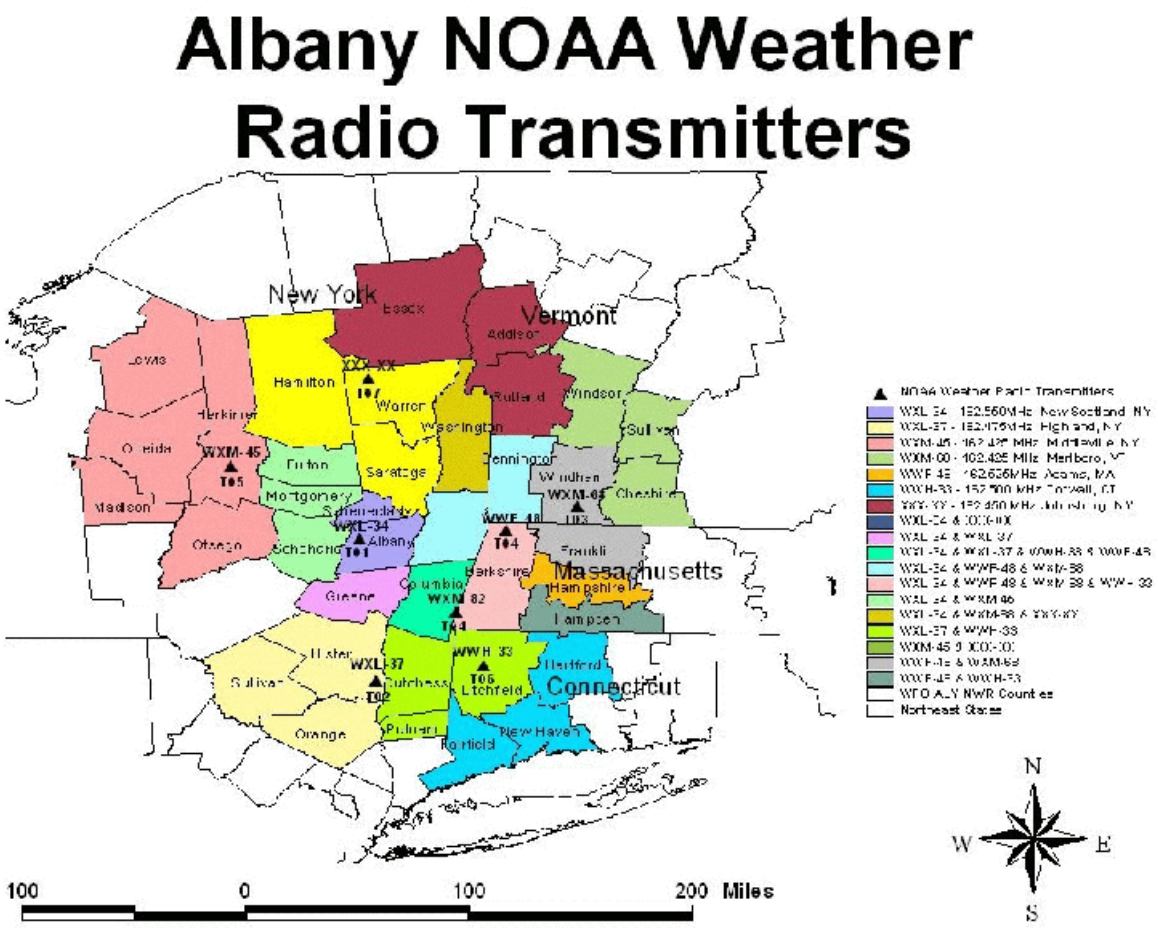

Fig. 3. Radio transmitters serving the WFO Albany listening area.

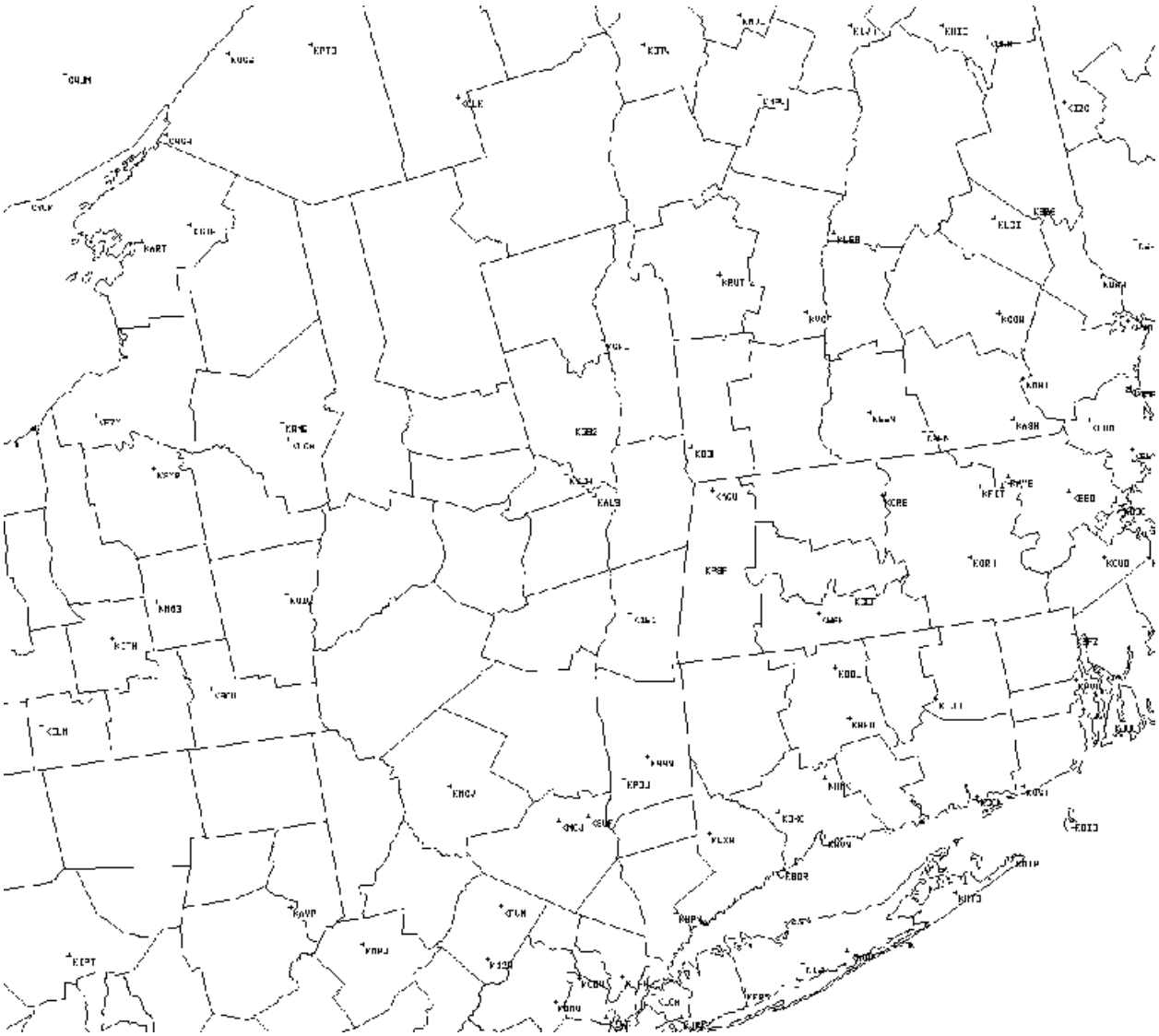

Fig. 4. Regional Automated Surface Observing System and Aviation Weather Observing System sites.

Fig. 5. North American Upper Air stations.